(12) PATENT ABSTRACT (11) Document No. AU-A-17310/92
(19) AUSTRALIAN PATENT OFFICE

(54) Title
METERING SPRAY GUN

International Patent Classification(s)
(51)[5] B65D 083/52 B05B 007/24 G01F 011/32

(21) Application No. : 17310/92 (22) Application Date : 29.05.92

(30) Priority Data

(31) Number (32) Date (33) Country
PK6660 12.06.91 AU AUSTRALIA

(43) Publication Date : 17.12.92

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(57) Claim

1. A manually operated gun for dispensing from a discharge orifice metered quantities of aerosol from a pressurised storage reservoir, said gun including

a manifold to provide fluid flow interconnection between a storage reservoir inlet, a discharge orifice and a metering reservoir,

a first valve selectively operable to fill said metering reservoir by allowing fluid flow communication between said storage reservoir, manifold and metering reservoir,

second valve means to selectively open the discharge orifice, and

actuating means movable between a first position in which said first valve is closed and said second valve is open and a second position in which said first valve is open and said second valve is closed.

AUSTRALIA

PATENTS ACT 1990

COMPLETE SPECIFICATION

FOR A STANDARD PATENT

ORIGINAL

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Invention Title: "METERING SPRAY GUN"

Details of Associated Provisional Application No. PK6660 dated 12th June, 1991

The following statement is a full description of this invention, including the best method of performing it known to me/us:-

The present invention relates to a manually operated gun for dispensing metered quantities of aerosol from a pressurised reservoir.

The invention has been developed primarily for use as a means of dispensing precise metered quantities of pesticides or biocides and the like and will be described hereinafter with reference to this application. However, it will be appreciated that the invention is not limited to this particular field of use.

In the past, the accurate dispensing of pesticidal aerosols has often relied on the skill of the operator to ensure for example that the correct dosage has been applied.

This has often been achieved to date by the fairly hit and miss method of, getting to know through experience what sort of feed rate is required for a given gun and cylinder of pesticidal preparation. The feed rate is rarely monitored and in areas where it is difficult to watch the aerosol dispensing, even visual monitoring of the process cannot be used. Furthermore, with many known gun designs, the quantity dispensed can be varied by the degree with which the valve is opened via depression of the trigger. This makes accurate control of the dispensing even harder.

Another method for trying to supply metered flow is through the use of fixed orifices in conjunction with accurate "one-shot" timers, thus relying on time control to determine the volume. Such devices can be complicated

and expensive and the results are not always accurate and reproducible.

As many preparations of this kind are either potentially hazardous if excess quantities are administered, or conversely ineffective if insufficient quantities are applied, it is essential that the dispensed quantities be as accurate as possible. Furthermore, many of these preparations are very expensive and application of excessive quantities is an unnecessary waste.

It is an object of the present invention to provide a manually operated gun for dispensing metered quantities of aerosol from a pressurised reservoir that will avoid or at least ameliorate the above disadvantages of the prior art.

According to the invention there is provided a manually operated gun for dispensing from a discharge orifice metered quantities of aerosol from a pressurised storage reservoir, said gun including

a manifold to provide fluid flow interconnection between a storage reservoir inlet, a discharge orifice and a metering reservoir,

a first valve selectively operable to fill said metering reservoir by allowing fluid flow communication between said storage reservoir, manifold and metering reservoir,

second valve means to selectively open the discharge orifice, and

actuating means movable between a first position in which said first valve is closed and said second valve is open and a second position in which said first valve is open and said second valve is closed.

In this way the gas or liquid and gas is transferred from the storage reservoir to the metering reservoir, from which a metered quantity of gas or liquid and gas can then be subsequently discharged from the gun in aerosol form.

Preferably, the volume of the metering reservoir is selectively variable to alter the metered quantity of liquid and/or gas dispensed. This can be achieved for example by placing inserts of known volume in the metering reservoir.

In a preferred embodiment the second valve means is reciprocally operable to open and close the discharge orifice, the second valve mechanism having an associated cam surface used to simultaneously control the first valve.

Preferably, there is delay between the actuation of the first and second valves to ensure that only one of the valves can be open at any one time.

In the preferred embodiment this is achieved by a degree of lost motion resulting from connection of one of the valves to the actuating means via a slot and pin coupling.

A preferred embodiment of the invention will now be described, by way of example only, with reference to the

accompanying drawings in which:

Figure 1 is a schematic side view of a metering device forming part of a gun according to the invention.

Figure 2 is an enlarged schematic sectional side view of the manifold and actuating means shown in Figure 1, illustrating the actuating means in the first position in which the discharge orifice is closed.

Figure 3 is an enlarged schematic sectional side view as shown in Figure 2 illustrating the actuating means in the second position in which the discharge orifice is open.

Referring to the drawings there is shown a metering device 1 forming part of a manually operated gun (not shown in full) for dispensing from a discharge orifice 2 metered quantities of aerosol from a pressurised storage reservoir shown in part at 3. An eductor tube 6 extends into the storage reservoir 3.

The metering device forming part of the gun includes a manifold 4 which connects via a first port 5 to the storage reservoir 3. A first valve in the form of a poppet valve 7 is provided in port 5.

Opposite the first port 5 is a second port 8 to which is connected a metering reservoir 9. A discharge valve 11 is provided within the manifold of 4 adjacent the discharge orifice 2 which is connected to reciprocating actuating means 13.

The actuating means comprise an actuating rod 15 which extends externally from the manifold 4 at one end

for connection with the trigger means of the gun (not shown). The rod 15 passes through an end plug 16 in which is provided a cup seal 17.

The discharge valve 11 is in the form of a generally cylindrical sleeve 19 terminating in a substantially conical valve face 21. A correspondingly tapered resilient valve seat 22 is provided adjacent the discharge orifice 2.

The discharge valve 11 is held captive on rod 15 by a pin 24 provided on the rod that engages with an elongate slot 25 provided in the valve sleeve 19. This facilitates limited reciprocal movement of the valve relative to the rod.

A substantially cylindrical cam 26 forms part of the rod 15 and is located at a point between the discharge valve 11 and the end plug 16. The cam 26 defines a first substantially cylindrical cam surface 27 which tapers down via a ramp surface 28 to a second recessed cylindrical cam surface 29. A first compression spring 30 seats against an end face of the second cam surface 29 and extends over the rod 15 to act on an end face of the discharge valve sleeve 19, to bias the valve face 21 toward engagement with the seat 22.

The storage reservoir 3 connects with the manifold 4 by means of a coupling 31 in which is housed the poppet valve 7. The valve 7 comprises an elongate actuating pin 32 slidably supported adjacent the inlet to the manifold 4 by a boss 33. The end of actuating pin remote from the

boss 33 terminates in a substantially conical valve head 34 which is biased towards sealing engagement with a correspondingly tapered valve seat 35 by means of a second compression spring 36. The spring is retained by a perforated plate 37.

The metering reservoir 9 has a removable lid section 40 to which inserts of various sizes can be secured in order to vary the reservoir capacity and thereby alter the metering quantity. In another embodiment the reservoir 9 itself is interchangeable with other reservoirs of different capacities.

Referring now in particular to Figures 2 and 3, the operation of the device according to the invention will be described.

Prior to the gun being operated, the actuating means 13 is in the rest position or first position as shown in Figure 2, with the discharge valve 11 sealing the discharge orifice 2. In this position the larger first cylindrical cam surface 27 is positioned over the actuating pin 32 of the poppet valve 7. This causes depression of the valve head 34 away from the valve seat 35, thereby allowing pressurised fluid from the storage cylinder to pass under pressure through the eductor tube 6 to the manifold 4 and the metering reservoir 9.

When the gun is then actuated by depression of the trigger (not shown), the actuating rod 15 is drawn toward the end plug 16. In the first part of this movement the cam moves to position the second cam surface 29 in line

with the actuating pin 32 of the poppet valve 7. This allows the pin to rise under the combined pressure of the spring 36 and the pressure in the reservoir, to shut off the valve 7.

During this movement of the rod and cam, the discharge valve 11 is maintained in the closed position by the biasing force of the first spring 30 and the pressure in the manifold and metering reservoir. The slot 25 thereby allows relative movement of the valve 11 with the rod 15 and is sized to ensure that the discharge valve does not open until the poppet valve 7 is closed.

When the trigger is fully depressed the actuating means will be in the second position or active position as shown in Figure 3, and the contents of the manifold and metering reservoir will be discharged through the discharge nozzle.

In another embodiment the valve arrangement illustrated is replaced by a three-way ball valve. Other three way valve configurations could also be used.

The embodiment described has been specifically designed to withstand the high pressures present when using carbon dioxide as a propellant and the components have been made predominantly from brass or bronze. However other suitable materials may be used.

It will be appreciated that the invention can be applied to all forms of aerosol, both single phase dispensing of gaseous products and dual phase dispensing of liquids with or without particulate matter.

In the embodiment described, the storage cylinder is connected directly to the gun and may itself be rechargeable. In other embodiments, the gun can be connected by a hose to a larger conventional storage cylinder.

Although the invention has been described with reference to specific examples, it will be appreciated by those skilled in the art that the invention may be embodied in many other forms.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. A manually operated gun for dispensing from a discharge orifice metered quantities of aerosol from a pressurised storage reservoir, said gun including

a manifold to provide fluid flow interconnection between a storage reservoir inlet, a discharge orifice and a metering reservoir,

a first valve selectively operable to fill said metering reservoir by allowing fluid flow communication between said storage reservoir, manifold and metering reservoir,

second valve means to selectively open the discharge orifice, and

actuating means movable between a first position in which said first valve is closed and said second valve is open and a second position in which said first valve is open and said second valve is closed.

2. A manually operated gun according to claim 1, wherein said second valve means is reciprocally operable to open and close the discharge orifice.

3. A manually operated gun according to claim 2, wherein said second valve means includes an associated cam surface used to simultaneously control the first valve.

4. A manually operated gun according to claim 1 wherein said first and second valve means form part of a single three-way valve arrangement.

5. A manually operated gun according to any one of the

preceding claims wherein a delay is provided between the actuation of the first and second valves to ensure that only one of the valves can be open at any one time.

6. A manually operated gun according to claim 5, wherein said delay is achieved by provision of a degree of lost motion resulting from connection of one of the valves to the actuating means.

7. A manually operated gun according to claim 6, wherein the lost motion results from connection of one of the valves to the actuating means via a slot and pin coupling.

8. A manually operated gun according to any one of the preceding claims wherein the volume of the metering reservoir is selectively variable to alter the metered quantity of liquid and/or gas dispensed.

9. A manually operated gun according to claim 8, wherein the volume of the metering reservoir is selectively variable by means of placing inserts of known volume in the metering reservoir.

10. A manually operated gun according to claim 8, wherein the volume of the metering reservoir is selectively variable by means of interchanging the reservoir with another reservoir of different capacity.

11. A manually operated gun substantially as herein described with reference to the accompanying drawings.

DATED this 29th day of May, 1992
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17310/92

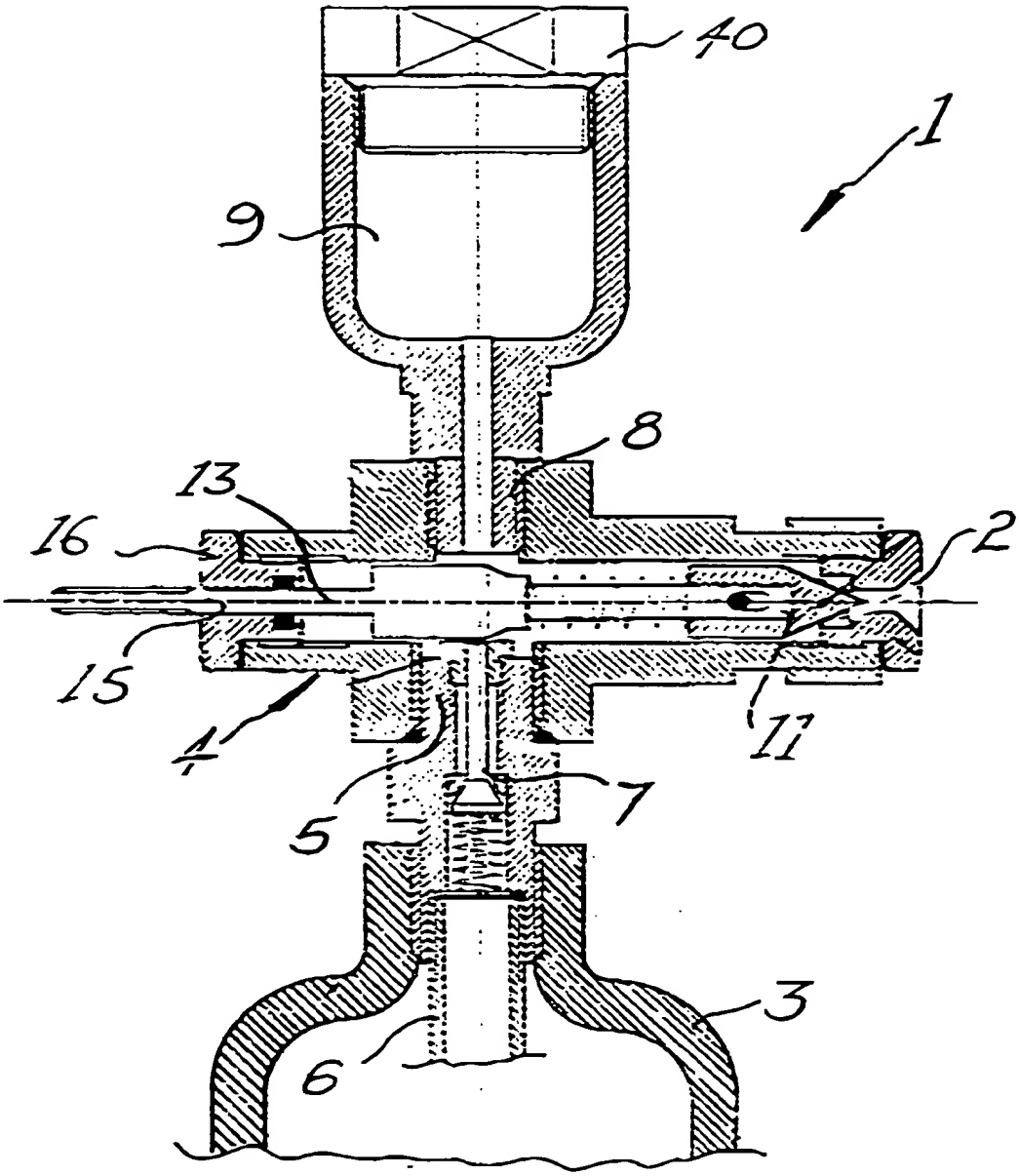

FIG. 1

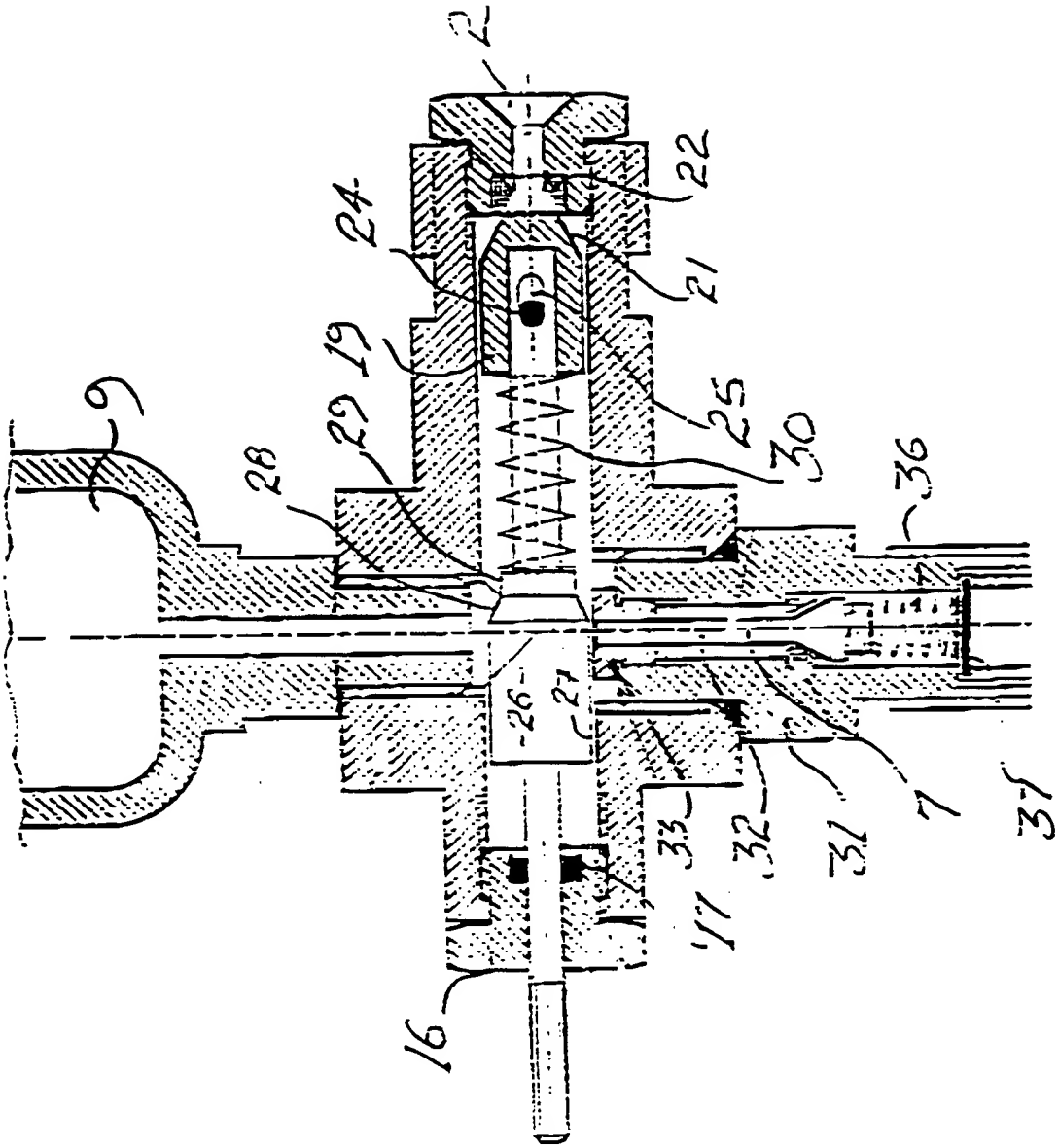

FIG. 2

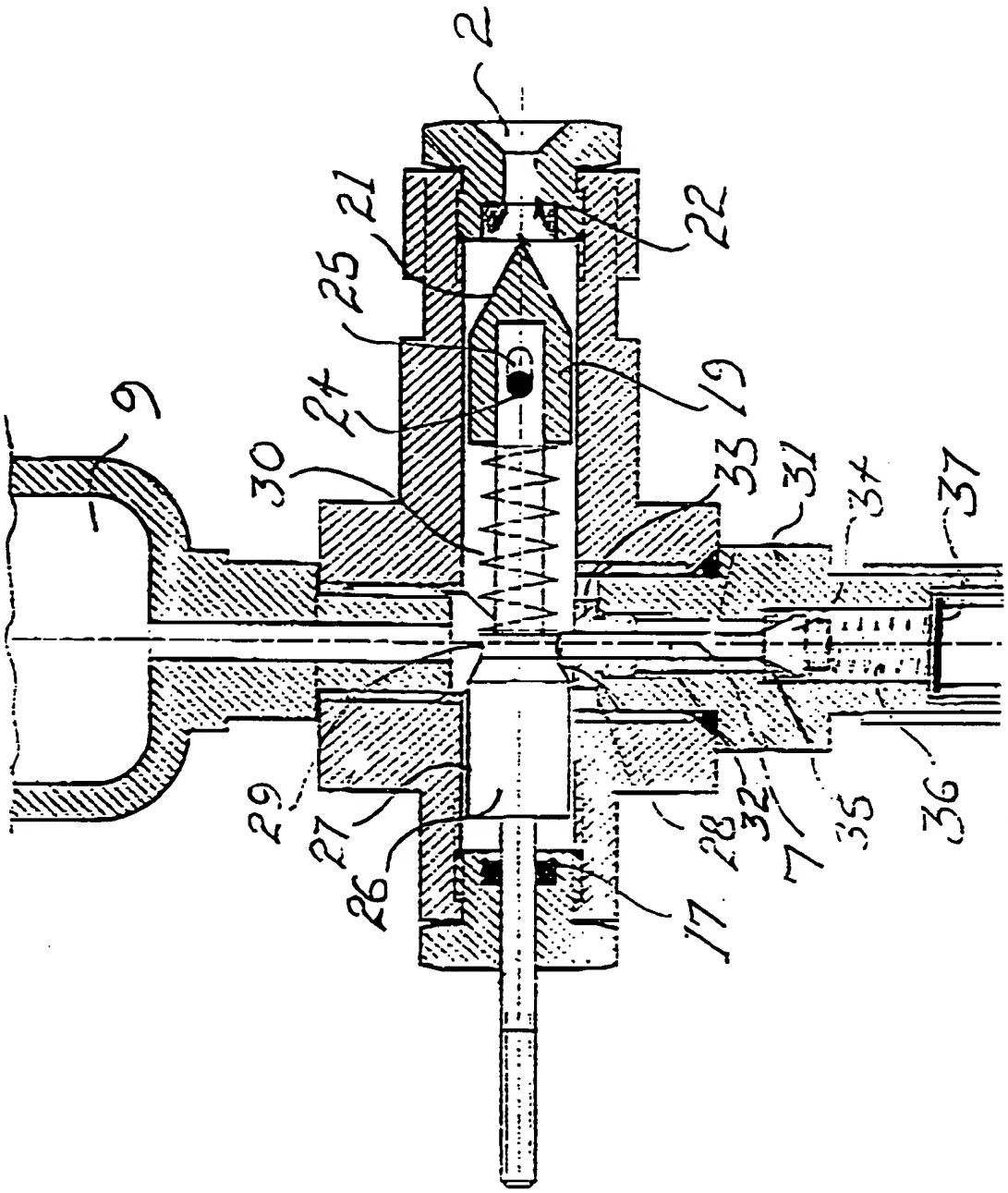

FIG. 3

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